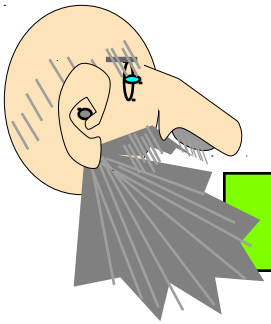
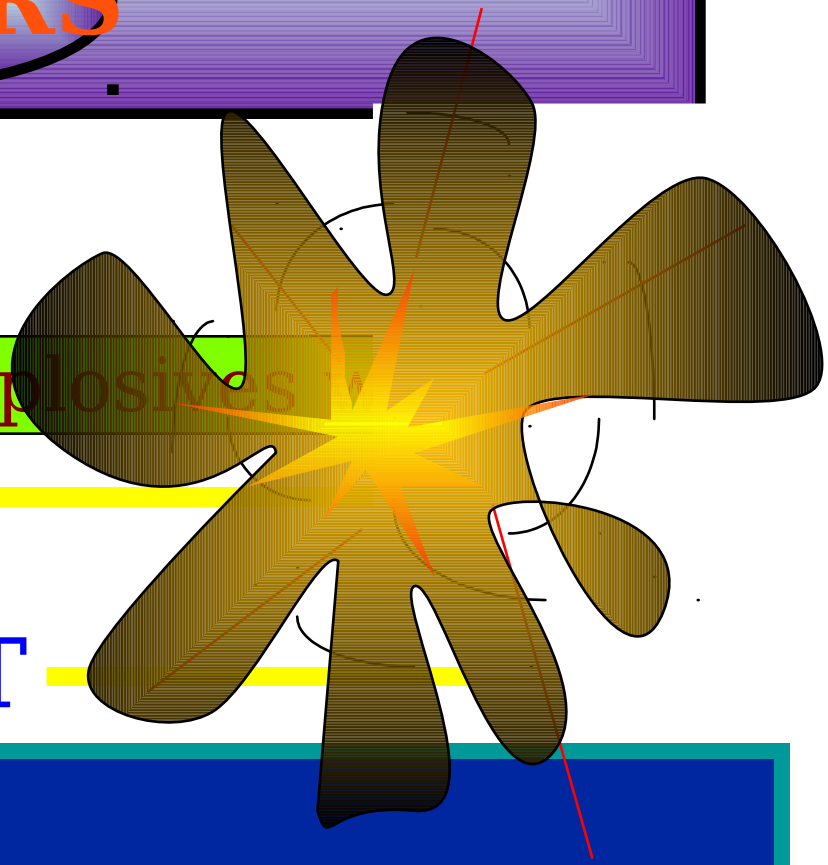
Explosives Safety For QA

A WISE MAN LEARNS FROM THE MISTAKES O

OTHERS



There are **old** explosives



BUT

There are **no old foolish** explosives

EXPLOSIVES SAFETY ORIENTATION

OBJECTIVE

You

Provide ***QA*** *at A&E contractors* **knowledge to:**

- Enable you to **work safely**
- **Assist** Contract Safety

REMEMBER

NOT:

Make you Safety Experts

CS QA

INTERFACE

REQUIREMENT:

DFARS 242.302(a)

Item 38 - Quality

Item 39 - Safety

DoD 4145.26-M

D Contractors' Safety Manu
r Ammunition and Explosiv

/www.dtic.mil/whs/directives/corres/pdf/414526m_0997/p414526m

equired for *all* Government explosives contract

WHY?

Contract safety

Protect

- People: Gov. Employees & Pub
- Government $
- Production Base

CS ROLE

- **Contractor Surveillance**
- **Assist DCMA SHM**

Resolve problems @ contracto
Discuss need for onsite inspec
Conduct S&H inspections
Record/report unsafe conditio
Conduct other onsite surveys
Maintain *“ One face to indust*

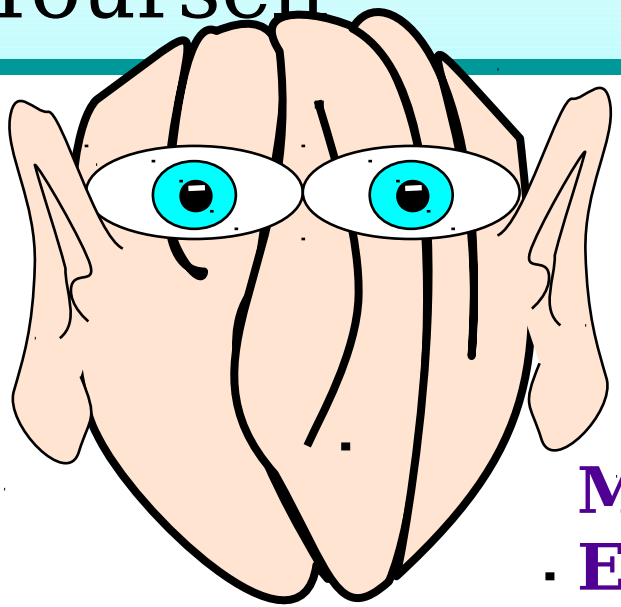
QA ROLE

Safety Compliance

- Comply with contractor and DCMA safety
- Report Hazards
- Request & Use PPE
- Protect Yourself

REMEMBER

EYES & EARS



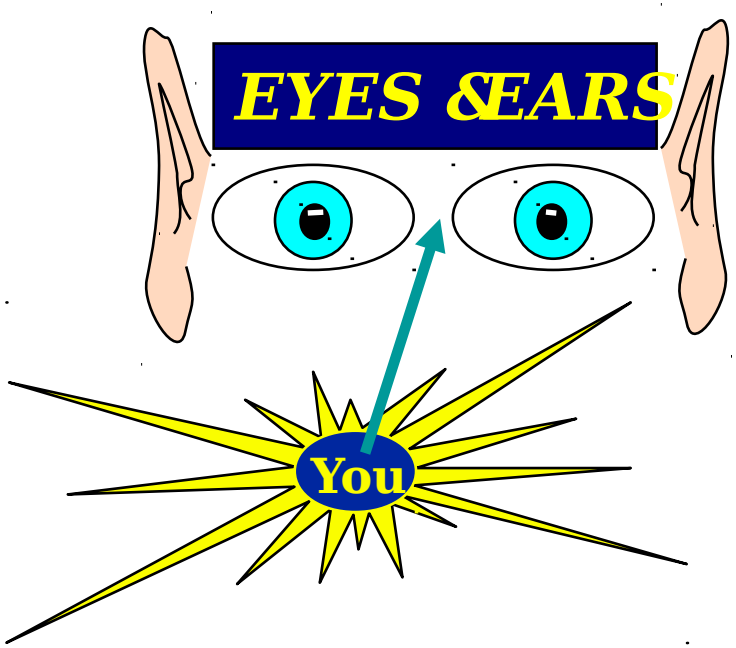
MORE

QA ROLE

Assist Contract Safety

- Contract Review
- Monitor CAs
- Observe
- Notify

REMEMBER



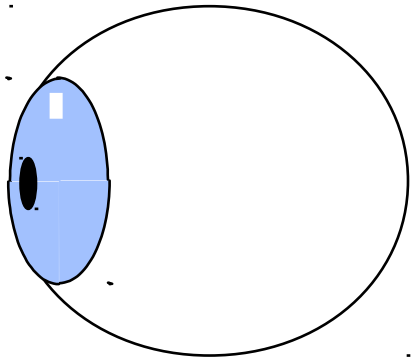
☆ **Contract review**

Safety Surveillance Claus

DFARS 252.223-70
DFARS 252.223-70
AIRCRAFT
AF Appx. C
(Under $250K-Customer Rqd.)
Navy J4, J5
FOD requirements
Military Tech. Pubs.
CSM

EXPLOSIVES Includes Subs
Invokes DoD 4145.26-M

Look For



Or…Has Explosives & No Claus

(Its 1716 time!)

OBSERVE

Not expected to be a Safety Specia

Watch for potential problems during norm

Report concerns to contractor Safety c

MONITOR CAs

- Non-Technical
- Readily Verifiable
- Needs No Judgement

NOTIFY

CS

Email, Phone, Fax
ASAP

Mishaps:

Fire, Explosion, Fatality, Injury, Gov Property Dama

Definition

Sudden release of pressure

MECHANICAL CHEMICAL

Balloon

Bean Can

Boiler

Tire

Cat

TNT

Black Powder

Hand Grenade

Dynamite

Detonator

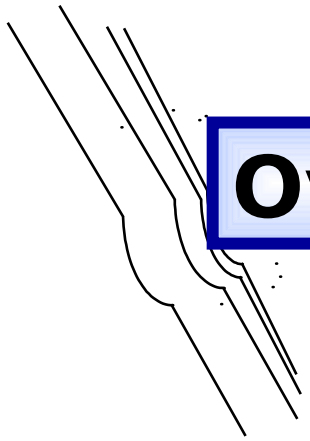
"The Bomb"

THERMONUCLEAR

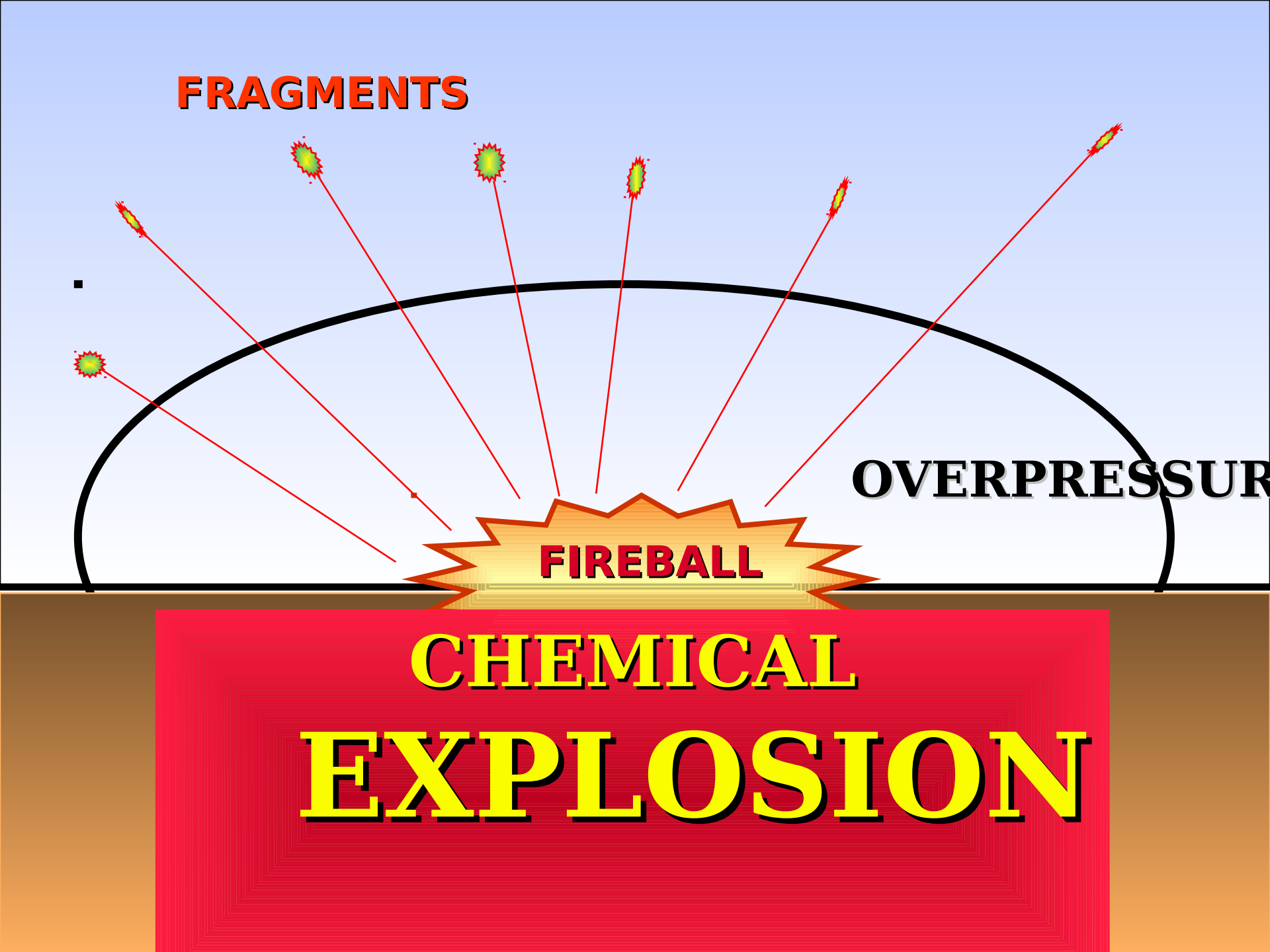
DAMAGE MECHANISMS

Fragments

Fireball



Overpressure


FRAGMENTS
OVERPRESSUR
FIREBALL
CHEMICAL
EXPLOSION

FIREBALL

STARTS SURROUNDING FI

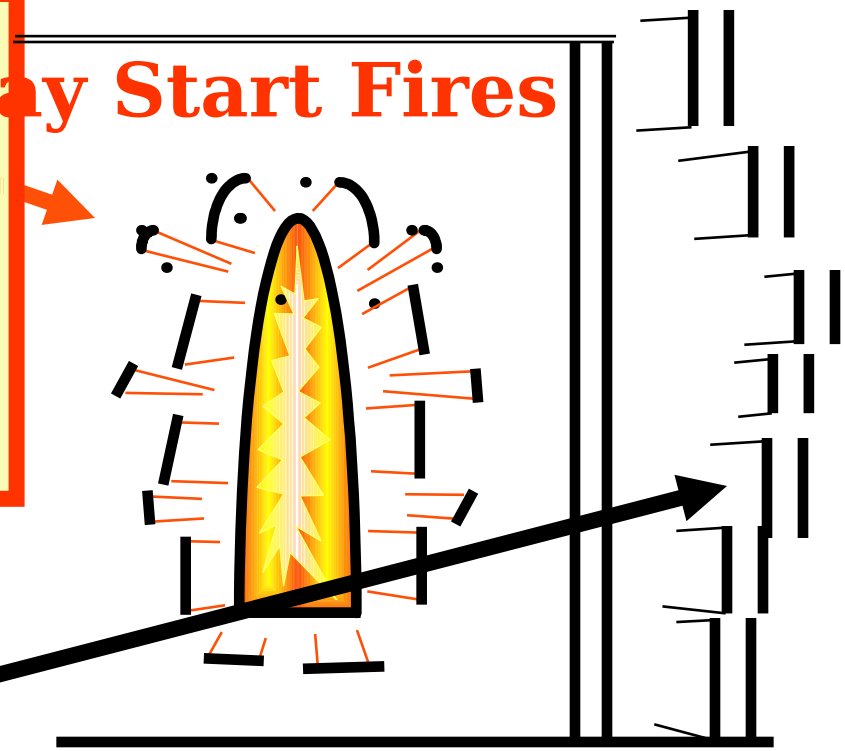
CLOSE-IN

RELATIVELY MINOR

FRAGMENTS

PRIMARY **HOT** **May Start Fires**

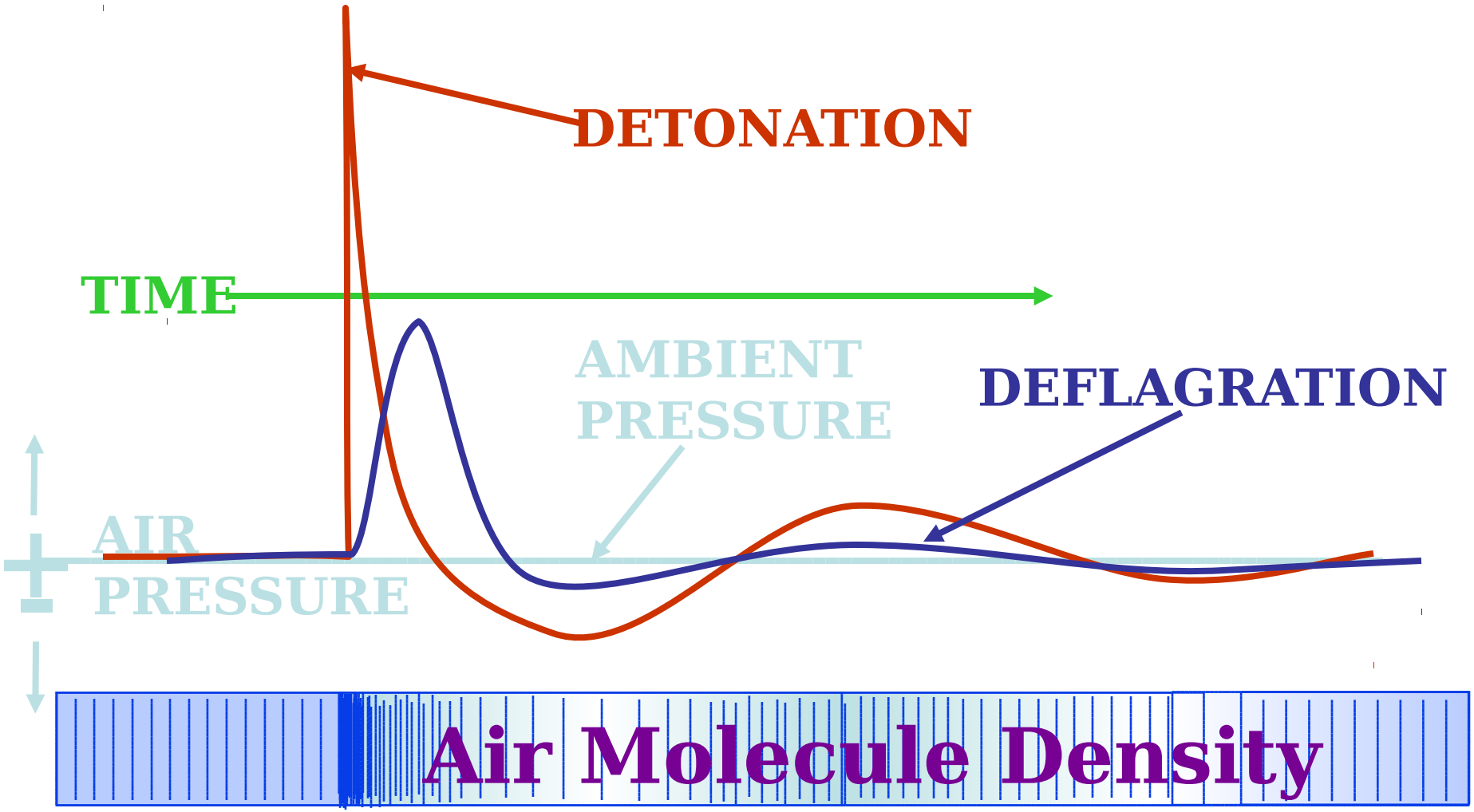
- **Contact with HE**
- **Small**
- **High Velocity**
- **Penetrating**



SECONDARY

- **Surroundings**
- **Larger**
- **Lower Velocity**

OVERPRESSURES



SENSITIVITY

- IMPACT — Hammer
- FRICTION — Match
- SPARK — Lighter
- BLAST — Bomb
- HEAT — Candle
- **EMR** — **Cap**
- Nitrocellulose → **AGE**

Initiation Stimulus

REMEMBER

ELECTROSENSITIVE EXPLOSIVES

0.1 Joule

Detonators
Primers
Priming Explosi
Secondary Expl
Electric Caps
EEDs

Engineering
Shunts
Grounded Conductive Mas
Conductive Shoes (Testers
Wrist Straps
Non-Static Generating Clo
Humidification
Static Dissipating Coating
Faraday Cages
Frag/Blast Shields

DEFINITION

REMEMBER

☆ COMPATIBITY

No **significant** increase in severity or p

Based on

1. Chemical/Physical Properti
2. Item Design
3. Packaging
4. Hazard Class
5. Net Explosives Weight
6. Rate of Chemical Deteriora
7. Sensitivity
8. Effects of Explosion/Fire

REMEMBER

COMPATIBITY

CHEMICAL/PHYSICAL PROPERT

Chemical

- Chemically Reactive
- Chemically Unreactive
- Caustic

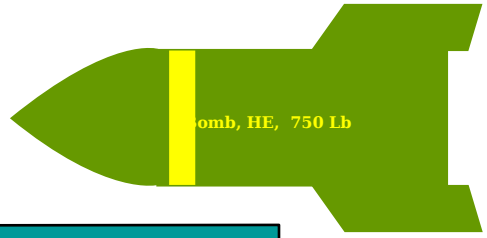
Physical

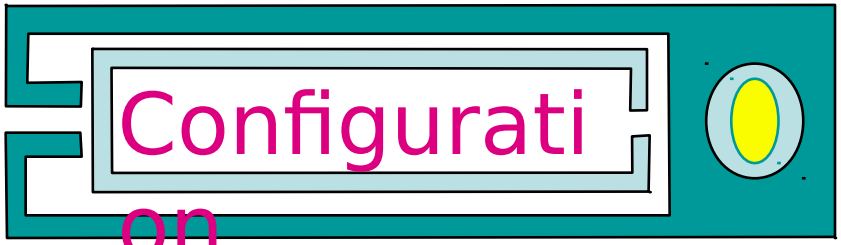
- **Solid**
- Liquid
- Gas

COMPATIBITY

ITEM DESIGN

Size





Initiation Resistance

Other

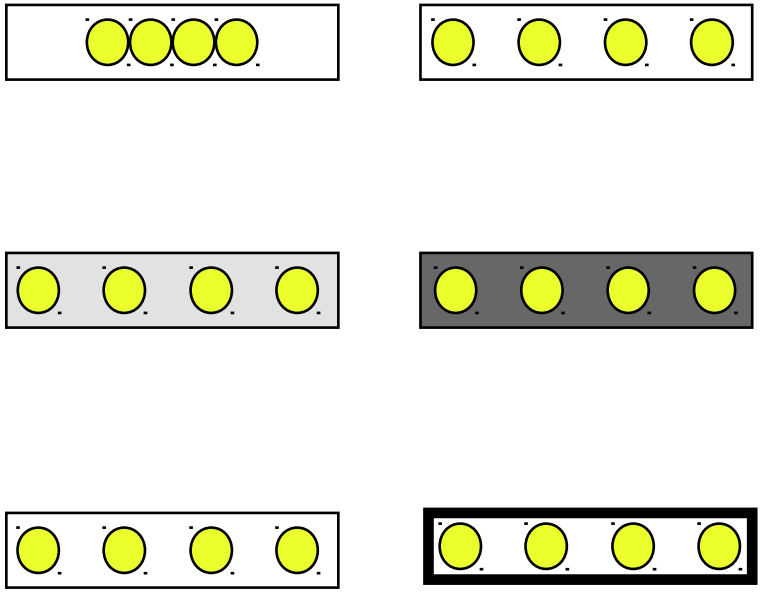
COMPATIBITY

PACKAGING

Distance

Density

Strength



Non-Propagating Pa

Shipping Bom

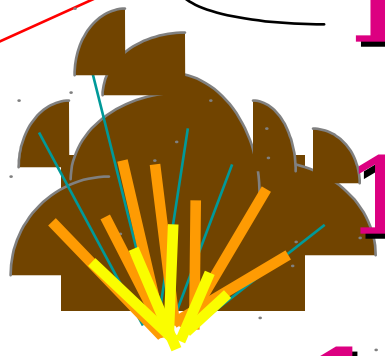
HAZARD CLASS

1.1 Mass Detonation

1.2 Projection

1.3 Mass Fire

1.4 Minor Explosion



COMPATIBITY

NET EXPLOSIVE WEIG

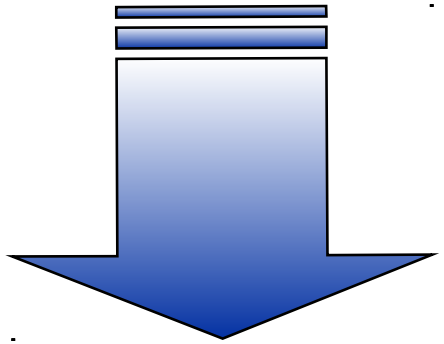
Detonators

Lead Charges

Boosters

Bursting Charges

Small



Larg

RATE OF CHEMICAL DETERIORATION

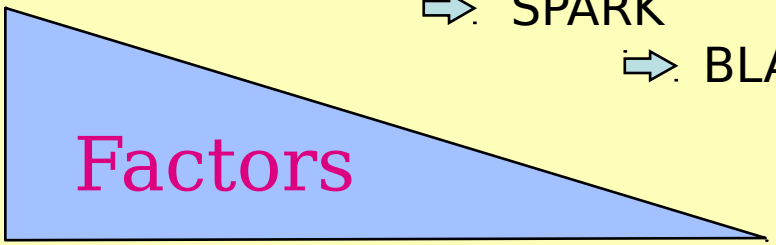
Nitrocellulose	Temperature & Time Sensitive
Pyrotechnics	Moisture sensitiv
TNT	Stable

COMPATIBITY

REMEMBER?

SENSITIVITY

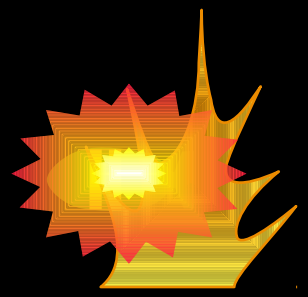
- IMPACT
- FRICTION
- SPARK
- BLAST
- HEAT
- **EMR**
- AGE



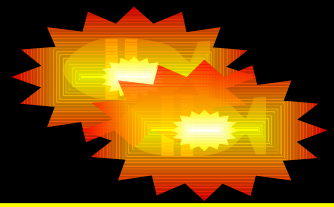
COMPATIBITY

EXPLOSION/FIRE EFFEC

Cookoff



Sympathetic Detonation



CARDINAL PRINCIPLE

Probability /Severity

Minimum PERSONNEL

Minimum EXPLOSIVES

Severity

Minimum TIME

Probabili
ty

SAFETY

REDUCE

PROBABILITY

Engineering & Design

ond/Ground, Nonsparking, Interlocks, Shielding, Item Desig

Admin & Operational

Written: How, When, Where, What, Who, Limits, Training

Personal Protective Equipment

Cotton Clothing, Conductive Footwear, Eye Protection

REDUCE SEVERITY

QD

CONSTRUCTION

REMOTE

SHIELDING

ENGINEERING & DESIGN

PROCEDURES

PPE

PROCEDURES

Develop SOP **BEFORE** Starting Ope

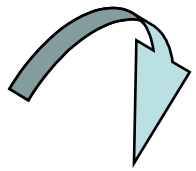
MUST HAVE

Safety Requirements

Emergency Procedures

PPE

MOR
E



PROCEDURES

- rsonnel & Explosives **Limits** at Each Operat
- All **Equipment**
- **Location & Sequence**
- **low, When Where & Who** Performs
- **Re-train** if Changed

HAZARD CLASSIFICATIO

1.1 Mass Detonating

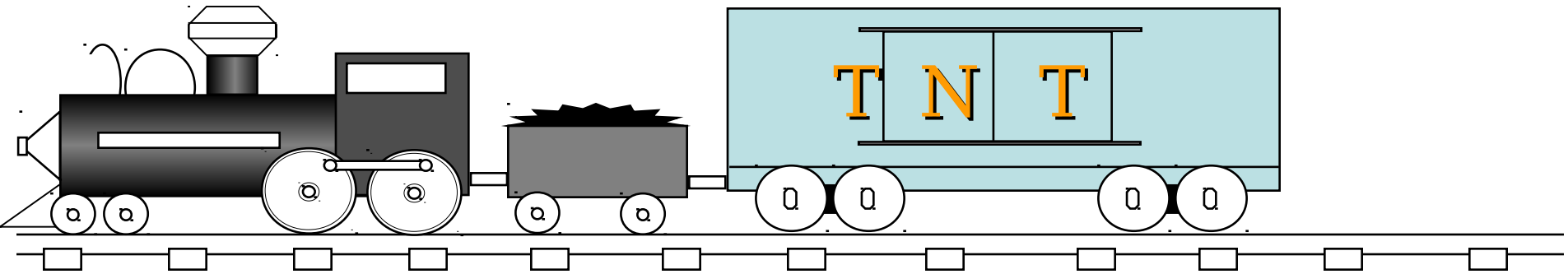
1.2 Non-Mass Detonating Frag

1.3 Mass Fire

1.4 Moderate Fire - No Blast

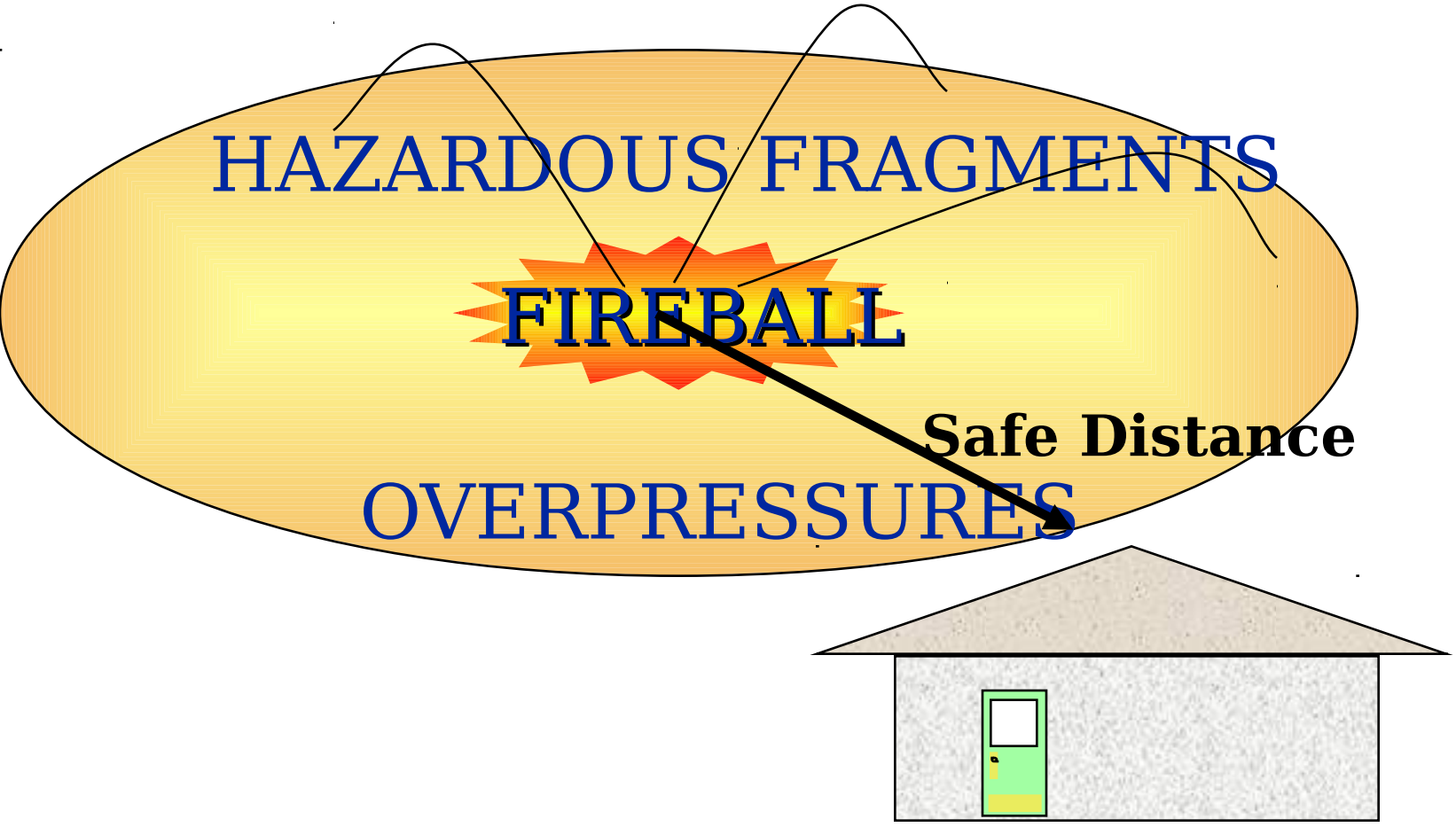
1.5 Insensitive HE

EXPLOSIVE TRAIN



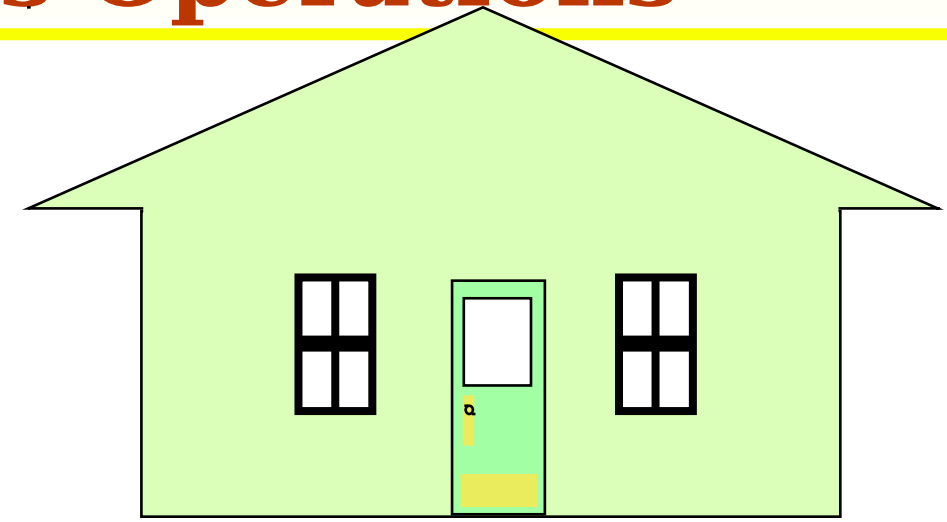
Primer/ Initiator	Relay/ Delay	Booster	Bursting Charge
Very Little Power	Little Power	More Power	Very Powerful
Very Sensitive	Sensitive	Less Sensitive	Least Sensitive

SAFE DISTANCE CONCE



HOUSEKEEPING

Often Considered the MOST IMPO
Factor in maintaining
Safe Explosives Operations



APPLICATION

Be aware of:

- Housekeeping
- Operations
- Storage
- Conductive Footwear
- Site Plans
- Emergency Procedur

ANY DOUBT
CALL SAFETY

Notify safety
if any change, construction or modification

TEAMWORK

SO YOU CAN WORK SAFELY

AND

WE CAN BE MORE EFFICIENT